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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/660,976	09/11/2003	Franco Vitaliano	VXM-001C (9374/2)	7892
7590 06/08/2006			EXAMINER	
Franco Vitaliano and Gordana Vitaliano			NEGIN, RUSSELL SCOTT	
4 Longfellow Place, #2105			ART UNIT	
Boston, MA 02114-2818			PAPER NUMBER	
			1631	

DATE MAILED: 06/08/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/660,976	Applicant(s) VITALIANO ET AL.	
	Examiner Russell S. Negin	Art Unit 1631	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 24 April 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-42, 44, 48-52, 54, 55, 58, 59, 62-64 and 66-68 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-21, 26-28, 31-42, 44, 48-52, 54, 55, 58, 59, 62-64 and 66-68 is/are rejected.
- 7) ☒ Claim(s) 22-25, 29 and 30 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date: _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>7/21/04</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

Applicant's election of species D, G, I and K in the reply filed on February 14, 2006 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

Claims 43, 45-47, 53, 56-57, 60-61, and 65 are cancelled by the applicant as being devoted to non-elected species. Election was made **without** traverse in the reply filed on February 14, 2006.

Notes

It is acknowledged that claims 43, 45-47, 53, 56-57, 60-61, and 65 are cancelled.

It is brought to the Applicant's attention that a product by process claim is examined for novelty and obviousness of the claimed product only, and that no consideration is given to the novelty or obviousness of the method of making the claimed product. See M.P.E.P. 2113. (i.e. claims 48 and 52 are product by process claims).

Claim Objections

Claims 22-25 and 29-30 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous

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claim. Claim 22 is dependent from claim 22. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Accordingly, these claims will not be treated on the merits in this Office action.

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims 1-21, 26-28, 33-36, 40-42, 44, 48-52, 54-55, 58-59, 62-64, 66, and 68 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

Claims 1-21, 26-28, 33-36, 40-42, 44, 48-52, 54-55, 58-59, 62-64, 66, and 68, as written, do not sufficiently distinguish over laser light sources that exist naturally because the claims do not particularly point out any non-naturally occurring differences between the claimed products and the naturally occurring products. In the absence of the hand of man, the naturally occurring products are considered non-statutory subject matter. See *Diamond v. Chakrabarty*, 447 U.S. 303, 206 USPQ 193 (1980). The claims should be amended to indicate the hand of the inventor, e.g., by insertion of "Isolated" or "Purified."

Claim Rejections - 35 USC § 101 & 112

35 U.S.C. 101 reads as follows:

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Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1-42, 44, 47-52, 54-55, 58-59, 62-64, and 66-68 are rejected under 35 U.S.C. 101 because the claimed invention is not supported by either a specific asserted utility or a well established utility.

While the specification states that the invention is to be used for quantum mechanical computing, it is unclear how someone skilled in the art would use a laser light source or method of making a laser light source for the purpose of solving a quantum mechanics or any mathematical calculation. As stated in the first sentence of paragraph [0001], "This invention relates generally to the field of quantum computing..." For example, Lee et al. [Science, volume 296, May 3, 2002, pages 892-896] shows usage of quantum dots in viruses but does not show how such particles can be used in quantum mechanical calculations. While there is a specific utility asserted in the specification, there is no real-world or "substantial" utility. Substantial research is necessary to use light as a means of satisfying the utilities given in the instant specification.

Claims 1-42, 44, 47-52, 54-55, 58-59, 62-64, and 66-68 are also rejected under 35 U.S.C. 112, first paragraph. Specifically, since the claimed invention is not supported

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by either a specific asserted utility or a well established utility for the reasons set forth above, one skilled in the art clearly would not know how to use the claimed invention.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 40 and 42 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 40 claims that the laser light source is a tunable source of light, yet does not specify if the intensity or frequency of the laser light is tunable.

Claim 42 claims that the laser light operates at an ultralow threshold, but does not say what this threshold is and if it applies to intensity or frequency. The metes and bounds of these two claims are thus unclear.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

Claims 1-14, 17-21, 26-27, 33, 44, 48, 51-52, 54-55, 58-59, 62, 64, and 66-68 are rejected under 35 U.S.C. 102(b) as being anticipated by Fujime [Journal of the

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Physical Society of Japan, 1970, volume 29, pages 416-430] in light of Namba et al.

[Journal of Molecular Biology, 1989, volume 208, pages 307-325].

Claims 1-21, 26-27, 33-36, 44, 48, 51-52, 54-55, 58-59, 62, 64, and 66-68 state:

1. A laser light source comprising: a cage defining a cavity formed from a plurality of self-assembling protein molecules, and one or more cargo elements located within the cavity, wherein at least one of the cargo elements defines a cavity that contains a fluid and or a quantum dot, wherein the cargo element cavity and or its contained fluid internally reflects one or more wavelengths of light in response to an electromagnetic excitation and wherein the laser light source emits one or more photons of light in response to a stimulus deforming the cargo element cavity.
2. A laser light source according to claim 1 comprising, receptors for capturing and positioning cargo elements within the self-assembling protein cavity.
3. A laser light source according to claim 2 comprising, a vesicle located within the cage and enclosing one or more cargo elements, wherein the receptors extend through the vesicle to capture and position a cargo element within the vesicle.
4. A laser light source according to claim 3 comprising, adaptors disposed between the receptors and the cage and binding to the receptors.
5. A laser light source according to claim 1 comprising, a vesicle located within the cage and enclosing one or more cargo elements.
6. A laser light source according to claim 1 comprising, molecular tethers for capturing and positioning one or more cargo elements within and or outside the cavity
7. A laser light source according to claim 1 comprising, direct cage bonding for capturing and positioning one or more cargo elements within and or outside the cavity.
8. A laser light source according to claim 1 further comprising, receptors, molecular tethers and direct cage bonding for capturing and positioning one or more cargo elements within the cavity.
9. A laser light source according to claim 1 further comprising, one or more cargo elements forming a non-permeable cavity.
10. A laser light source according to claim 3 further comprising, a vesicle forming a non-permeable cavity.
11. A laser light source according to claim 3 comprising, a vesicle defining a cavity

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located within the cage, wherein a fluid and or a quantum dot are contained in the vesicle cavity.

12. A laser light source according to claim 1, wherein the cage is electrically neutral and inhibits charge transfer between the cage and its enclosed cargo elements.

13. A laser light source according to claim 3, wherein the vesicle is electrically neutral and inhibits charge transfer between the vesicle and its enclosed cargo elements.

14. A laser light source according to claim 4, wherein the receptors and adaptors are electrically neutral and inhibit charge transfer between the vesicle and cage and their enclosed cargo elements.

17. A laser light source according to claim 1 comprising, a self-assembling framework of cages to structurally support one or more self-assembling light sources.

18. A laser light source according to claim 1 comprising a self-assembling electrically neutral substrate of cages to structurally support one or more self-assembling light sources.

19. A laser light source according to claim 1 comprising, a self-assembling framework of cages to structurally order one or more self-aligning light sources.

20. A light source according to claim 1, wherein the one or more cargo elements is a single cargo element comprising a cargo element that defines a cavity that contains a fluid and or a quantum dot.

21. A light source according to claim 1, wherein the one or more cargo elements are a plurality of cargo elements.

26. A laser light source according to claim 1, wherein the cargo elements respond to stimuli internal and or external to the cage.

27. A laser light source according to claim 3, wherein a vesicle and its contained cargo elements respond to stimuli internal and or external to the vesicle.

33. A laser light source according to claim 1, wherein the internal or external deforming stimulus includes one or more stimuli of any suitable type, including but not limited to mechanical, chemical, fluidic, biological, photonic, thermal, sonic, and electrical or electromagnetic stimuli.

44. A laser light source according to claim 1, wherein the laser light source is a single task or multitask in vivo and or in vitro agent.

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48. A laser light source according to claim 1, wherein the cage is bioengineered in whole or in part.

51. A laser light source according to claim 4, wherein receptors, adaptors, and vesicle comprise natural and or synthetic protein molecules.

52. A laser light source according to claim 4, wherein the receptors, adaptors, and vesicle are bioengineered at least in part.

54. A laser light source according to claim 3, wherein the vesicle is coated at least partially in one or more materials.

55. A laser light source according to claim 1, wherein the cage is coated at least partially in one or more materials.

58. A laser light source according to claim 4, wherein the receptors, adaptors, and vesicle are at least partially coated in one or more materials.

59. A laser light source according to claim 1, wherein the cage is greater than about one nanometer in diameter.

62. A laser light source according to claim 1, wherein the cage is substantially symmetric with respect to a plane.

64. A light source according to claim 1, wherein multiple light sources are physically and or functionally linked together.

66. A laser light source according to claim 1, wherein the laser light source forms a hybrid system upon its physical and or functional integration with elements in vitro and or in vivo.

67. A method for forming a light source comprising self-assembling protein molecules into a cage defining a cavity, and locating one or more cargo elements within the cavity, wherein, at least one of the cargo elements defines a cavity that contains a fluid and/or a quantum dot, wherein the cargo element cavity and or its contained fluid internally reflects one or more wavelengths of light in response to an electromagnetic excitation. and wherein the laser light source emits one or more photons of light in response to a stimulus deforming the cargo element cavity.

68. A laser light source according to claim 1 comprising, a functionalized cage for attaching one or more elements external to the cage.

The article of Fujime, entitled, "Quasi-elastic light scattering from solutions of macromolecules. I. Doppler broadening of light scattered from solutions of Tobacco Mosaic Virus," explains how TMV is used to scatter light deflected from a laser light source. The TMV, collectively with the laser, form a light source that yields the light patterns which are diffracted from the virus. The virus itself is a cage defining cavity formed from a plurality of self-assembling protein molecules. The cargo within the cavity is shown in Namba et al. to be the RNA illustrated in Figure 9 and water molecules as listed in Table 2 on page 312 of Namba et al. The water constitutes a fluid. Thus, the RNA and water form a fluid inside the virus. The virus and its cavity reflect wavelengths in response to the excitation of the laser and emit photons in response to result in a different diffraction pattern of light.

The virus as illustrated in Figure 1 of Namba et al. has receptors for positioning the cargo elements from outside to inside of the cargo element cavity. The inside of the cavity is a vesicle. The virus binds to objects outside the cavity, and thus is viewed to have tethers for positioning cargo elements within and or outside the impermeable cavity. If pH is adjusted to a proper value, the virus is electrostatically neutral inhibiting charge transfer between particles. The virus blocks the light radiation of the laser in a way to cause the virus to affect radiation using its cage and vesicle. The virus is interpreted as a framework of cages self assembling to form a light source. The laser light is a stimulus external to the cage that to which the virus, its cavity, and its cage responds. The cages and vesicles are coated by proteins and water molecules. The

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virus itself is greater than one nanometer in diameter. The TMV has a functionalized cage for attaching to other particles external to the cage.

As the first sentence of the abstract of Fujime states, "By use of a laser light source and photoelectric light mixing technique, spectral densities of light scattered from solutions of tobacco mosaic virus particles were measured in order to obtain translational and rotational diffusion coefficients..."

However, Fujime does not show the structure and the inherent properties of TMV.

Figure 1 and Table 2 of Namba et al. illustrate the physical properties of TMV germane to the instant application (i.e. the three dimensional picture of TMV along with the interactions between enclosed water molecules and nucleic acids.)

Conclusion

No Claim is allowed.

Papers related to this application may be submitted to Technical Center 1600 by facsimile transmission. Papers should be faxed to Technical Center 1600 via the central PTO Fax Center. The faxing of such pages must conform with the notices published in the Official Gazette, 1096 OG 30 (November 15, 1988), 1156 OG 61 (November 16, 1993), and 1157 OG 94 (December 28, 1993)(See 37 CFR § 1.6(d)). The Central PTO Fax Center Number is (571) 273-8300.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Russell Negin, Ph.D., whose telephone number is (571) 272-1083. The examiner can normally be reached on Monday-Friday from 7am to 4pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's Supervisor, Andrew Wang, Supervisory Patent Examiner, can be reached at (571) 272-0811.

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Any inquiry of a general nature or relating to the status of this application should be directed to Legal Instrument Examiner, Tina Plunkett, whose telephone number is (571) 272-0549.

Information regarding the status of the application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information on the PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

-RSN June 5, 2006

Pat 5 June 2006

John S. Brusca
5 June 2006
JOHN S. BRUSCA, PH.D
PRIMARY EXAMINER